

Natural Hazards Informer

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Flood Mitigation Planning The CRS Approach

by
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Why Plan?

So, your community has a flood problem . . .

Your residents and elected officials probably want to see if solved as quickly as possible, maybe even want a flood control project that will keep the problem away forever. However, such a response to flooding has many shortcomings, most notably expense, environmental disruption, and future watershed development that can make a project obsolete.

You probably also know that there are many alternatives to building a flood control project, ranging from managing development in floodplains and their watersheds, to acquiring or floodproofing buildings and infrastructure, to educating citizens about how to protect themselves and their property from floods.

There is no shortage of possibilities for dealing with a flood problem. The key is to select options that are appropriate for the local situation—in other words, “mitigation planning,” a systematic, objective review of the flood problem and what can be done about it.

In order to convince the public and decision makers that mitigation planning is the way to go, tell them:

- It ensures that all alternatives are reviewed so that the local flood problem is addressed by the most appropriate and efficient solutions (which may or may not include structural projects). Translate “most efficient” to “least costly” and you should get their attention.
- It ensures that activities are coordinated with each other and with other community goals and activi-

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ties, preventing conflicts (see the box at right) and reducing the costs of implementation.

- It educates residents and other planning participants on available hazard and protection measures.
- It builds public and political support for projects, thus preventing new problems and reducing current exposure.
- It builds a constituency that wants to see the mitigation measures implemented.

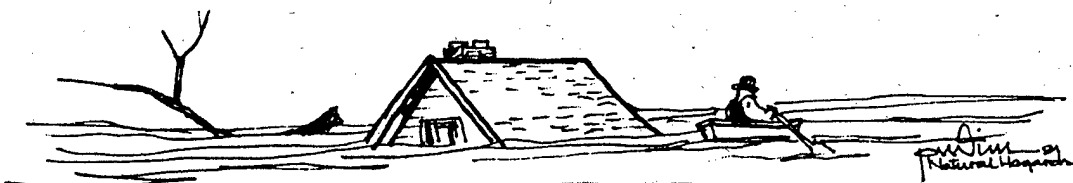
These advantages should provide adequate reason for your community to undertake a flood mitigation plan. However, planning is often not initiated on the basis of its merits. So, here's another reason: it can help you get money. Several federal funding programs require or strongly recommend a plan as a prerequisite for assistance, including the Federal Emergency Management Agency's (FEMA's) Flood Mitigation Assistance and Hazard Mitigation Grant Programs and several flood control programs of the U.S. Army Corps of Engineers.

Planning is also encouraged by FEMA's Community Rating System (CRS). Under the CRS, flood insurance premiums are reduced based on a community's floodplain management activities. The CRS can get residents' attention because they see a direct financial benefit—lower flood

Conflicts in Flood Management

Have you seen these situations? Mitigation planning can resolve conflicts that often exist between flood protection and other community goals and activities.

- The public works department straightens ditches and lines them with concrete so they carry more floodwaters, while the parks department or neighborhood groups are promoting greenways and natural vegetative approaches to streambank and hillside stabilization.
- Knowing there is money for a "buyout," residents call for acquiring flooded homes—in spite of the city council's desire to maintain the tax base and utility customers.
- Property owners view a swamp as a place to be filled in so it can be farmed or built on, without realizing the wetland's role in absorbing floodwater and providing habitat.
- Residents and business owners complain that nothing is being done about flooding, but they are not aware of all the things they can do to protect themselves or how they can contribute to community and neighborhood efforts.



The Natural Hazards Informer

This is the first in a new, peer-reviewed series that summarizes current knowledge about various aspects of natural hazards for practitioners, researchers, public policy makers, and others. It is distributed free to all subscribers of the *Natural Hazards Observer*.

What This Informer Does

This issue of the *Informer* describes a process for developing a community flood hazard mitigation plan, especially one that will be recognized by the National Flood Insurance Program's Community Rating System (CRS). It provides a step-by-step process to develop a plan and offers tips and guidelines for making the process successful. Persons interested in obtaining more detailed information on hazard mitigation planning, floodplain management, and the Community Rating System are encouraged to explore the bibliography and recommended reading at the end of this paper. Although the focus of this issue is floods, the process can also be used in mitigation planning for other hazards.

Who Should Read This and Why

This issue should be read by anyone involved in a community flood mitigation program, especially city and county planners, because it provides valuable advice on how a community can reduce its vulnerability to floods while also meeting other community goals such as economic vitality and environmental quality. Further, this *Informer* outlines a process that is easily adaptable to a variety of hazards and hazard programs. Finally, anyone interested in the problems faced in developing a community plan of any sort may benefit from this view of the "real world" of mitigation planning.

insurance premiums. (And, once you have residents' attention, you have the attention of elected officials.)

Not only are the CRS floodplain management activities more effective when undertaken pursuant to a mitigation plan, the CRS provides additional credit to a community that implements one. That is, the CRS provides credit points for a plan that has been prepared, adopted, and implemented in accordance with its criteria, and these criteria provide excellent guidance on preparation of a community flood mitigation plan. In fact, plans that meet the latest CRS criteria meet the planning prerequisite of the FEMA and Corps programs noted above.



These criteria are found in the *CRS Coordinator's Manual* under Activity 510 (Floodplain Management Planning). More details and three model plans are found in the CRS publication, *Example Plans*. Both are available for free by calling (317) 848-2898. (If you're just interested in mitigation planning, you only need *Example Plans*, which has everything in the *Manual* and more).

This issue of *The Informer* reviews the CRS planning criteria and offers some suggestions for implementing a plan locally. It is based on the authors' 40 years of combined experience in flood mitigation planning and the lessons learned by others who have helped refine the CRS criteria into a proven approach.

The Planning Process

Keep in mind that your objective is not to crunch out a fancy document; what really counts is how you prepare your plan. It is not the resulting publication, but rather the *process* of planning that is important, including reviewing activities, educating residents, obtaining consensus, building constituencies, and all the other great things mentioned earlier.

There are 10 steps to the CRS planning process. Actually, there's nothing unique about it, since planners will

recognize the classic planning approach of gathering information, setting goals, reviewing alternatives, and deciding what to do. The steps are:

- 1) Organize to prepare the plan.
- 2) Involve the public.
- 3) Coordinate with other agencies.
- 4) Assess the hazard.
- 5) Evaluate the problem.
- 6) Set goals.
- 7) Review possible strategies and measures.
- 8) Draft an action plan.
- 9) Adopt the plan.
- 10) Implement, evaluate, and revise the plan.

We will look at these 10 steps in a little more detail. However, note that many states and regional agencies have developed their own, often more locally appropriate, planning procedures. In some cases, certain steps must be followed to comply with state law. Check with your state planning agency, National Flood Insurance Program (NFIP) coordinator, or emergency management agency's hazard mitigation officer for information on requirements, guidance, and assistance.

Also consider whether mitigation planning should be incorporated into your community's comprehensive planning process. On one hand, if it is not part of a comprehensive plan, you may be able to avoid some constraints and formalities (such as the legal process required for public hearings). On the other, you may want to trade flexibility and informality for the status and legal authority your mitigation plan will have if it is part of a comprehensive plan.

In either case, your flood planning needs to be coordinated with other planning efforts. But, be aware that a floodplain management plan or mitigation plan involves many more activities than a land-use plan. Determining the best land-use and construction standards for flood-prone areas needs to be a part of the process, but so do warning activities, public information, and a whole host of other efforts that can lessen flood impacts.

One final introductory note: this is a basic planning process. The 10 steps work, as witnessed by communities that have followed them and are reducing flood losses. However, an experienced planner or an office with a large staff can and should improve on this basic approach. More data, more sophisticated materials, and a more formal decision-making process can be helpful, especially in larger communities.



1. ORGANIZE TO PREPARE THE PLAN

The planning process will succeed only if the right people and agencies are involved.

The planner: Selecting the person in charge of the planning process is the crucial first step. We assume that person is you, the reader. You may be a professional planner or you may be an emergency manager, a council member, or the chair of the citizens' planning committee. Whatever your background, be sure to check on the state requirements for planning and coordinating with other planning efforts.

It helps if you are officially designated with the authority to develop the plan. A council resolution or a memo from the city manager or mayor is useful, because one of your biggest challenges will be getting other departments to devote some attention to your task.

It also helps (in fact, it's vital) to have an open mind about the variety of potential mitigation measures. Different professionals will bring their own preferences to the process. For example, a mitigation plan designed by an engineer often favors structural measures, while a plan prepared by an emergency manager may be biased toward flood warning and response activities.

Staff support: Your first job is to line up staff responsible for implementing the plan. They need to be involved in the planning process for three reasons:

- They know the technical details of the measures you will be considering (i.e., they know how to make the mitigation measures work).

Who Can Help?

There are many offices that should be involved in mitigation planning, including:

- Planning/community development (planning direction, coordination with other plans, programs to help residents and businesses)
- Engineering (flood data, structural measures)
- Emergency management (emergency services measures)
- Public safety/police/fire (emergency services measures)
- Public works/streets/highways (structural measures, channel maintenance)
- Building/zoning/code enforcement (land-use regulation, building and property protection)
- Public information/community relations (property protection measures, public involvement)
- Parks/nature preserve (acquisition, protection of natural areas)
- Governing board/manager's office (political acceptance and adoption)

- They will be responsible for implementing some of the plan's recommendations. You need to make sure they can do what is recommended.
- They need to *want* to implement what is recommended. The most well-designed program will die if the responsible staff are indifferent or opposed to it. Get them involved early and make the plan *their* plan, too.

2. INVOLVE THE PUBLIC

As noted earlier, the planning process will succeed only if the right people are involved. Two groups are vital: the community's technical staff, which was already mentioned, and the public. Public stakeholders can include:

- Owners and renters of homes exposed to flooding
- Representatives of homeowner or neighborhood organizations
- Business owners and managers
- Managers of critical facilities, such as power stations and schools
- Farmers and others who affect watershed runoff conditions
- Land developers, real estate agents, lenders, and others who affect the future development of the community

These people have their own concerns, and hazard mitigation is probably not one of them. Do not view them as trouble makers or dead weight, but as people who can help you design and support an effective program. There are some real advantages to involving them:

- They provide more local knowledge of the flooding hazard and historical floods.
- They will help design a program that better fits their needs.
- They will help strengthen resident and business support for the program.
- They will help prevent misunderstandings.
- They can help share the workload.

The last item can be doubly rewarding. Floodplain residents can provide some of the data you will need, such as historical high water marks and flood damage information. Also, involving the public in this effort involves them in the whole process and helps them to become invested in the outcome, something that will pay off when it is time to submit the plan for adoption and implementation.

There are a variety of ways to involve the public. Members of the public can

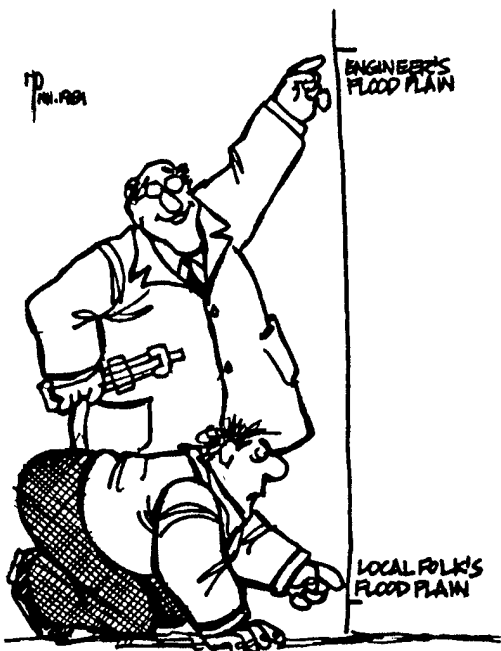
- Serve on or send a representative to a mitigation planning committee
- Attend meetings on flooding and mitigation to provide input
- Respond to a questionnaire that helps define the problem and identify the kinds of solutions that are acceptable
- Learn about recent developments through a newsletter or presentations at organization meetings
- Review and comment on the draft plan

A Planning Success Story

Following a flood in 1990, Village officials of South Holland, Illinois, were faced with many angry residents who were convinced that the Village was not doing enough to protect them. The Village formed a Flood Liaison Committee so residents and staff would work together.

The Committee spent a year preparing a floodplain management plan that reviewed all the alternatives and recommended 31 action items. The Village began providing technical assistance and a floodproofing rebate program that has helped fund over 300 self-help protection projects.

Residents are now active participants in the Village's mitigation program. South Holland has since received one of the highest ratings in the Community Rating System (Class 6), has received state and national awards, and has played a lead role in the initiation of a watershed-wide flood and stormwater mitigation planning effort.



Planning committee: Creating a planning committee is a simple and proven way to involve both staff and the public. We strongly recommend a committee of 10 to 15 people, representing local government staff and the public, to bring key stakeholders together. A committee can be a forum to review the needs and concerns of all interested groups, and a means for participants keep their departments and the community up to date on the plan's progress.

The importance of this approach is reflected in the credit points awarded by the CRS program. Having a planning committee with at least half of the members from the public is worth more points than any other single item in this CRS activity.

3. COORDINATE WITH OTHER AGENCIES

There are two reasons to involve government agencies and private organizations in your planning effort. First, they may be implementing or planning to implement activities that can affect flooding or other concerns. As mentioned earlier, it is important to keep mitigation planning efforts from conflicting with an existing government program or duplicating the efforts of another organization.

The second reason is to obtain help, which may be in the form of flood data, technical information on various measures, guidance on regulatory requirements, advice and assistance in the planning effort, implementation of a recommended measure, or financial assistance to help implement a recommended measure.

Agencies to contact include:

- The FEMA regional office
- Your state's natural resources or water resources agency, emergency management agency, coastal zone management agency, and planning or local government affairs office
- Regional or metropolitan planning, water, sewer, or sanitary districts
- U.S. Department of Agriculture agencies that work with property owners (e.g., the Natural Resources Conservation Service and the Cooperative Extension Service)
- Your district office of the U.S. Army Corps of Engineers
- The National Weather Service
- The U.S. Geological Survey
- The U.S. Fish and Wildlife Service

Also coordinate with the following organizations, which either conduct flood mitigation programs or represent the various "publics" you want to involve:

- Your local chapter of the American Red Cross

- The local planning commission and other citizen or advisory boards or committees
- The local Chamber of Commerce, manufacturer's association, and other business groups
- Parent-teacher and church organizations that have strong neighborhood ties
- Water oriented or watchdog groups, like "Friends of the _____ River"
- The Izaak Walton League, the Sierra Club, and other environmental organizations
- The League of Women Voters and other civic groups
- The Conservation Foundation, land trusts, and others interested in preserving floodplain or watershed open space
- Organizations of boaters, fishers, scouts, hunters, and other floodplain visitors

The public representatives on your planning committee can help identify appropriate organizations. The list can be long. At a minimum, contact these groups and tell them the planning schedule; they may want to participate somewhere along the line.

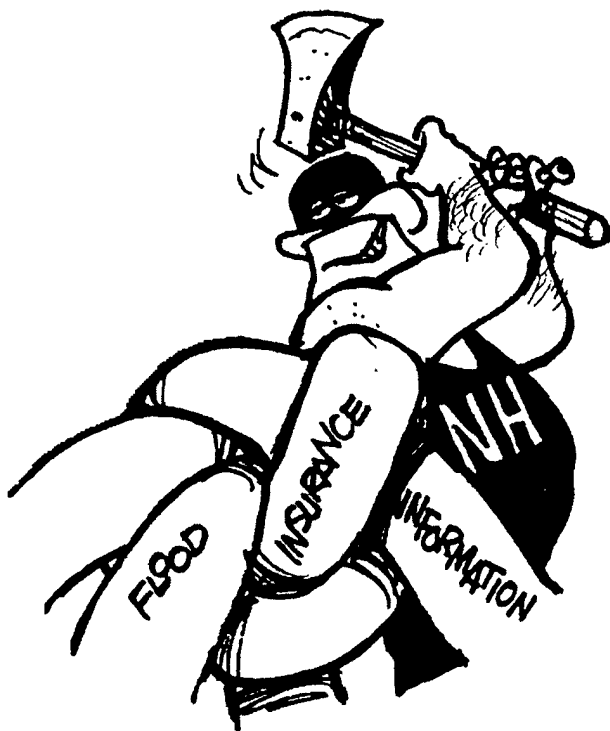
Many activities, such as maintaining a stream that forms a common boundary, should also be coordinated with neighboring communities. Also, many activities, such as flood warning and stormwater management, can be more effective or less expensive when done on a regional or watershed basis.

4. ASSESS THE HAZARD

Now that you are organized and have everyone on board, start collecting data. First, identify flooding areas of concern. Do you need to look at one neighborhood, the whole city, or every flood problem in the watershed? A common pitfall is focusing on the site of the last flood. Although this area may evoke the most interest, look at the *potential* for flood problems.

The base flood: Start with the base flood—a statistical concept that considers both the likelihood and severity of a flood. The base flood is also known as the often misunderstood "100-year flood" or by the technical term, "1% chance flood." If you use the last two names, make sure the non-engineers in your planning effort understand them.

People may have heard the term "100-year-flood" in relation to a recent flood and think they've seen the worst that nature can dish out, although the base flood is really a minimum standard for regulation. We like "base flood" because it forms the "basis" for your planning and does not imply that this is a rare event.



To begin, you should have a Flood Insurance Rate Map (FIRM), which shows your base floodplain as mapped by FEMA. It identifies the flood hazard area that your community must regulate under the NFIP and that lenders and insurance agents use in determining who must purchase flood insurance and how much a policy costs. In other words, the NFIP has already designated an area that your mitigation planning should address.

Planning Hint

The time and effort spent on collecting data depends on the time and resources available. However, the planning process should not be delayed while waiting for more data in order to develop a highly detailed problem description.

Other flooding: Use the FIRM's floodplain as a starting point, then consider flooding in drainage areas too small to be reflected on the FIRM as well as problems discovered since the FIRM was prepared. Many communities have experienced floods larger than the mapped base flood. Public involvement should identify these problem areas, and the planning committee should decide which ones to address. In most cases, it pays to include them all—don't ignore anyone's floods.

A lot of help is available from other agencies and organizations; ask them for maps, descriptions, and historical data on the hazards with which they are familiar. Along with the FIRM, your community received a Flood Insurance

Study, which has additional historical and technical information.

This step should produce a written description and assessment of all the flood hazards facing the community, including the mapped base flood and larger historical floods. It may also include local drainage problems, sewer backup (if water is in someone's house, it's a flood to them), and even flood-related problems, such as erosion and subsidence. A map can be a very useful tool for summarizing and displaying the areas affected by different types of flooding.

5. EVALUATE THE PROBLEM

Flooding by itself is not necessarily a problem—flooding becomes a problem when it affects human development. Often, large areas, such as beaches, forests, and pastures, may be flooded with minimal impact to humans. Thus, the next step in the planning process is to combine flood hazard data with information on what is specifically affected by flooding in order to evaluate the problem.

Getting participants to agree on a problem statement is the first step in getting them to agree on goals and solutions. The problem description should include a map or series of maps of areas of concern, which can be updated as more information becomes available. The problem statement should also describe the impacts of flooding.

Buildings: The Community Rating System requires a count of the number of buildings affected by each type of hazard, e.g., overbank flooding, coastal storm surge, local drainage, sewer backup, erosion, etc. This count also informs planners and other interested parties of the magnitude of the problem.

The building count should reflect use and type of building, because hazards affect each type differently. For example, an historic site or local landmark may deserve more attention than other properties because of its special value to the community. The flooding of a commercial or industrial building is likely to be more costly than that of a house and to have a broader impact on the community if it has to close after a flood. On the other hand, many local officials feel that businesses can take care of themselves and owner-occupied housing deserves more attention.

Similarly, a flooded city hall will have a greater impact on the community than a flooded residence. A building with a basement will be hit harder by shallow flooding and sewer backup than one with a crawlspace. Whatever your priorities, time and resources dictate how much data can be collected. In most cases, aerial photos or a windshield survey will provide needed data (you may also be able to get help from the residents on your planning committee).

Another useful bit of information is an assessment of predicted or actual building damage. Again, other agencies can help. "Average annual damage" figures may be available from a study by the Corps of Engineers or the Natural Resources Conservation Service. Historical damage in the

form of flood insurance claims is available from FEMA (but remember to adjust the numbers to reflect uninsured losses).

If time and resources permit, you may want to use computerized loss estimation modeling software to evaluate your flood problem. An example is the FEMA-funded "HAZUS" model. Originally designed to estimate losses from earthquakes, HAZUS will soon be available to estimate future losses from other hazards, including wind and flood. This software allows you to use local information on building stock and other factors to estimate losses that might occur in various size flood events, thereby providing good information for flood mitigation planning.



Repetitive losses: FEMA programs, especially the CRS, are particularly concerned about "repetitive losses"—two or more flood insurance claims for more than \$1,000 for the same structure over a 10-year period. Such buildings represent fewer than 2% of the flood insurance policy base, but over 35% of claims payments.

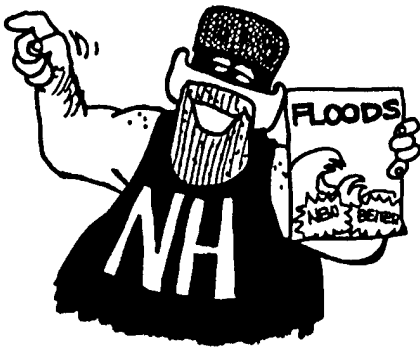
If you are a community official, you can get a list of your community's repetitive losses from 1978 to the present from your FEMA regional office. (If your community currently participates in the CRS, it already has that information.). Many communities have found this information to be useful because it identifies previously unknown problem areas. Developing mitigation responses to repetitive loss problems may also help your community compete for FEMA funds.

Other properties: Floods impact more than buildings. The problem assessment should also review the following items:

- Critical facilities, such as emergency operations centers, communications facilities, hospitals, and schools that may be damaged or isolated

- Roads, bridges, and transportation facilities that may be damaged or closed
- Other infrastructure, such as water and sewage treatment plants, that could become inoperable due to a flood
- Protection measures in effect or under construction
- Impacts of past disasters
- Undeveloped areas and wetlands that provide natural and beneficial functions

Other concerns: A plan needs to discuss other community concerns besides protection from flooding. During this phase of the planning process, invite people with other interests, such as recreation, water quality, economic development, and historic preservation, to be involved. Some of them may have already prepared plans or written problem statements.



Future directions: Finally, your problem definition should review expected changes to your community and its watershed, particularly the potential for vacant land to be developed. Note the trends for redevelopment in any of the flood-prone areas and possible constraints, such as a land-use plan, zoning, or ownership.

Take a look at the watershed. Is there a lot of land subject to a lot of development? If so, the runoff into your community will likely increase, and, if not managed, the frequency and height of flooding will increase as well. Are natural storage areas going to be developed? Will other areas of natural or cultural importance be lost?

6. SET GOALS

Up to this point, your planning work has been relatively noncontroversial, consisting of talking to agencies and organizations and collecting and recording facts. Now comes the tough part—getting people to agree on what should be done.

There is a choice at this step. You can limit your work to reacting to your flood problem and identifying flood mitigation goals, such as “Protect lives during a hurricane,” “Reduce the potential for flood damage to existing build-

ings,” and “Prevent construction of any more buildings in the floodway.” Such goals are appropriate and in line with the minimum credit criteria for the CRS.

Your second choice is to look at how the floodplain and watershed affect your community. Many planners now promote a “vision” step in the planning process in which people review how they’d like their community to look in the future. What should your floodplain look like 20, 50, or 100 years from now? Is your vision of the floodplain limited to how well buildings are protected, or should you discuss the best use of this sensitive area?

Is your vision simply of an area free from water damage, or can you take advantage of the attention currently being given to flooding, coordinate it with other goals, and outline a way to develop a better community—not just a flood resistant one? If so, you may have some additional goals or vision statements, such as “Have a river clean enough for swimming and fishing,” “Preserve all wetlands and natural storage areas in the watershed,” “Have a waterfront that attracts people,” and “Eliminate all substandard housing in the area.”

Consensus: It is often easy to reach agreement on overall goals, but it is not unusual to take a long time to reach consensus on specific objectives related to particular areas or individual properties. However, doing so is time well spent and vital to gaining cooperation from all affected parties.

Make goals positive statements, something people can work for, not negative statements about the community. Where possible, settle on goals that support more than one interest, e.g., “Implement erosion reduction measures to sustain farmland, improve water quality, and reduce sedimentation in stream channels.”

Strive for unanimous support, or at least agreement that no one will oppose a goal or objective statement. Short of that, you or your committee chair will have to decide if decisions are made using the method of last resort—majority vote.

7. REVIEW POSSIBLE STRATEGIES AND MEASURES

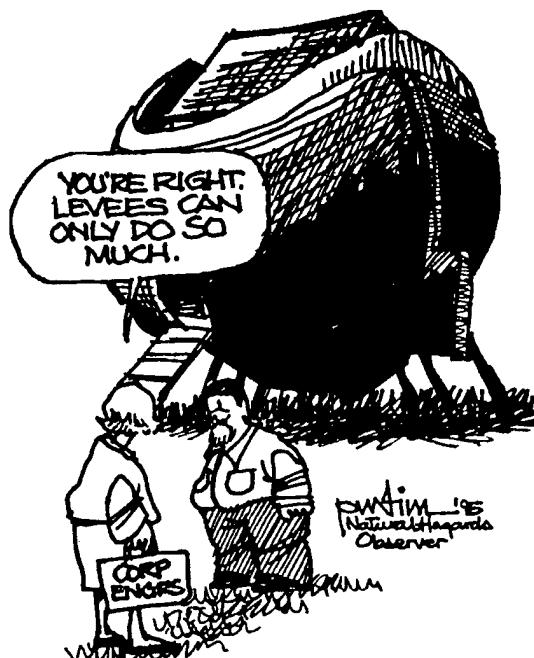
There are many different measures that can be used to solve flood problems as well as to meet other objectives. Many are inexpensive and easy to use, and some are probably already being implemented. The entire planning process is meaningless unless all possible alternatives are examined.

The CRS encourages a review of six general mitigation strategies. These are listed in the box on page 10, along with example measures, and can be used as a checklist. Don’t eliminate anything until each item has been given careful consideration. While some measures may be quickly eliminated, most should be evaluated to determine how they

work as well as their costs and benefits. During this planning step, walk your planning committee through a systematic review of each measure. Determine whether and how a measure is currently being implemented and then review appropriate changes. Discard a measure only after the following questions are answered negatively:

- Is the measure technically appropriate for the hazard?
- Does it support any of the goals and objectives?
- Do its benefits equal or exceed its cost?
- Is it affordable?
- Will it comply with all local, state, and federal regulations?
- Is it fair to all concerned?

Also consider whether a project will have a beneficial or neutral impact on the environment and how the floodplain will look when it's completed.



Questions about technical aspects or agency programs should be directed to experts from the agencies or organizations with whom you coordinate (see Step 3). Depending on your situation, you may want to formalize your process of selecting recommended measures and document how you decided to include or not include some activities, especially if they're controversial.

Funding: Many of the measures will require additional expenditures. This is another instance in which other agencies and organizations can be of great assistance. There are literally hundreds of public and private programs that can help fund worthy projects. They usually have several prerequisites, such as a written plan, a budget, and an explanation of benefits.

Some projects can be funded by several different parties, each of which is interested in one or more objectives. Often, agencies and organizations can fund only part of a project, and they usually favor those projects that have other sources of funding. In other words, they prefer to support multiobjective projects, and this is where coordination with other community goals and objectives can pay off.

Don't forget local sources of funding. Businesses and organizations will frequently support projects that benefit their customers, employees, or members, or that provide a public relations benefit. Many projects, such as an acquisition project that creates more parking space for businesses, provide direct benefits to local groups.

Finally, don't forget "in-kind services," which can be an excellent alternative to cash. Instead of paying for park maintenance, why not have a service organization maintain the area with volunteers? Often, in-kind services can be counted toward the local share needed to match other funding.

Balanced program: One of the greatest benefits of the 10-step planning approach is that it promotes balance in tackling flooding and other community problems. It should not be considered an excuse to justify someone's favorite project above all others, such as a large levee, nor should it emphasize one option, because you will likely wait years for such a solution. The odds are good that a flood will occur before such a big project is completed.

Although most attention is usually focused on reducing losses to existing development, dealing with future development and preserving natural areas pays off in the long run and prevents small problems from becoming bigger ones. A balanced program with measures from each of the six mitigation strategies will help to protect existing development, manage new development, and protect natural and beneficial floodplain functions. Also, the CRS provides more points if more than one or two of the six mitigation strategies are recommended.

To encourage more balanced programs, FEMA is transforming the historical postdisaster emphasis in state mitigation planning into a more holistic approach that looks at both predisaster and postdisaster activities and emphasizes a state and local cooperative approach.

Planning Hint

Your first priority should be to develop a plan that meets your community's needs, not one designed just to obtain funds or meet the requirements of only one state or federal agency. This can be difficult, because some grant programs encourage certain measures.

For example, after a disaster there is a strong push to prepare a mitigation plan, because it is a prerequisite to acquisition (or "buyout") funding. With only one goal in mind, such plans tend to focus on acquiring the worst hit areas to the detriment of modifying other areas, enacting other mitigation measures, and pursuing other community improvement opportunities.

Flood Hazard Mitigation Measures

Preventive activities keep problems from getting worse. The use and development of the floodplain and contributing watershed are limited through planning, land acquisition, or regulation. These activities are usually administered by building, zoning, planning, and/or code enforcement officials:

- Planning and zoning
- Open space preservation
- Building code development and enforcement
- Stormwater management
- Drainage system maintenance
- Dune and beach maintenance

Property protection is usually undertaken by property owners on a building-by-building or parcel basis. Such measures include:

- Relocation
- Acquisition
- Retrofitting
- Insurance

Emergency services measures are taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities:

- Warning
- Dam condition monitoring
- Emergency response planning
- Evacuation
- Critical facilities protection
- Health and safety maintenance

Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Levees/floodwalls/seawalls
- Diversions
- Channel modifications
- Beach nourishment
- Storm sewers

Natural resource protection preserves or restores natural areas or the natural functions of floodplains and watersheds. Such measures are usually implemented by parks, recreation, or conservation agencies or organizations. They include:

- Wetlands protection
- Best management practices
- Erosion and sediment control
- Coastal barrier protection

Public information programs advise property owners, potential property owners, and visitors of the flood hazards as well as ways to protect people and property from them. They are usually implemented by a public information office. They can include:

- Flood maps and data
- Library resources
- Outreach projects
- Technical assistance
- Real estate disclosure information
- Environmental education programs

8. DRAFT AN ACTION PLAN

Only after assessing the problem, setting goals and objectives, and reviewing all possible solutions can you begin to select the most appropriate mitigation measures for your community. This effort culminates in the written plan—a series of recommendations detailing what will be done, by whom, and when.

The plan can be in any format. However, at a minimum, it should include three things:

- 1) **A description of how the plan was prepared.** This helps readers (and potential funding agencies) understand the background and rationale for the plan and how public input was obtained.
- 2) **Recommendations for action.** The plan should clearly identify what will be done, by whom, when, and how it will be financed. It can be a

prioritized list of projects and assignments—the more specific, the better.

- 3) **A budget.** Again, the plan should explain how your recommendations will be financed and clearly delineate costs. It should note those recommendations, such as policies and public information activities, that can be implemented as part of normal operations without special funding.



Example Plan Organization

1. Introduction
 - a. Why there is a plan
 - b. How it was prepared
 - c. Who was involved
2. Problem description
 - a. For each hazard, discuss:
 - Hazard description
 - Impact on property
 - Impact on safety and health
 - b. Other community considerations:
 - Recreation needs
 - Fish and wildlife
 - Economic development
 - Future trends
 - Other considerations
3. Goals and objectives
4. Alternative measures
5. Recommended measures

For each measure include:

 - Description
 - Objectives supported
 - Who is responsible
 - When it must be done
 - Who can help
 - Budget
6. Implementation and evaluation
7. Adoption
 - a. Implementation schedule
 - b. Monitoring
 - c. Evaluation and revision

For CRS credit, the written plan must describe what you did in steps 4 through 8, i.e.,

- Hazard assessment
- Problem assessment
- Goals and objectives
- Possible flood mitigation activities
- Action plan

Post-flood preparations: Communities have found the period immediately after a flood to be very trying. Thus, the more prepared a community is beforehand, the better. Such preparation can be an important investment, because the days and weeks following a flood offer a unique opportunity for flood hazard mitigation for the following reasons:

- A flood will bring federal, state, and regional people from various agencies and fields together to focus on the community and its flood problems.
- Residents and elected officials will be more interested and more willing to address flood problems as well as try new solutions.
- If damage was sufficiently severe, it may be relatively easy to clear out a destroyed area and begin anew.
- If damage was severe enough to warrant a major disaster declaration, there will be several different sources of money available for buying or rebuilding properties to provide protection from future flood damage.



The best time to get ready for this “window of opportunity” is when you prepare your pre-flood mitigation plan. Some communities have separate sections in their plans that address post-flood procedures and activities, such as:

- Damage assessment
- Permit and inspection procedures for repairs and reconstruction
- Mutual aid and other support needed for inspections and planning
- Interpretation and enforcement of NFIP substantial damage requirements
- Retrofitting structures during repair and reconstruction
- Identification of properties that should be acquired in order to remove at-risk structures from the floodplain
- Financial assistance

It pays to walk through the “what if” of a flood and sort out priorities, policy issues, and procedures in the pre-flood mitigation plan. The planning committee can reconvene after the flood to determine what modifications are needed to the plan, policies, etc.—that’s a lot easier than starting from scratch during a trying period in which there are many demands on staff.

A Planning Success Story

In 1991, the City of Arnold, Missouri, prepared a floodplain management plan, in part to meet requirements of the Community Rating System. The plan identified a need to purchase some damage-prone properties in the Meramec River floodway and develop a greenway along the riverfront.

The planners recognized that funding would be needed for such a large undertaking, noting, "While there are no funds presently available to relocate these homeowners, such funds often become available after a flood." At that time, the building commissioner and community development director were charged to stop reconstruction of these buildings after a flood (or other disaster) until funding sources were checked and an acquisition project was reviewed with the owners.

In fact, such activities were implemented less than two years later following the Great Mississippi Flood of 1993. Arnold received the needed funding and now has a greenway. After that flood, the city was recognized by FEMA as one of the best-prepared communities for mitigation funding.

Planning Hint

It always helps to get support from other entities. For example, a plan with recommendations on watershed management could go to the local soil and water conservation district for a vote of adoption or support. If your planning committee members were selected to represent particular interests or organizations, their organizations could pass resolutions or otherwise officially support the plan.

10. IMPLEMENT, EVALUATE, AND REVISE THE PLAN

Adoption by your governing board is not the last step in the planning process. There should be some monitoring and follow up to ensure that your plan will be implemented.

Implementation: The key to successful implementation is ensuring that the people responsible for the recommendations understand what is expected of them and are willing to work toward their implementation. That's why they were involved in the planning process. It will help greatly if the plan (or the governing board's resolution of adoption) clearly identifies responsibility for each recommendation.

Planning Hint

It can be very helpful for a plan to identify some visible but inexpensive projects that can be quickly implemented. This helps reassure the public and the planning committee that something is being done. Often, this should be a locally funded project (because it typically can be completed quickly), such as a stream cleanup or distribution of public information materials.

9. ADOPT THE PLAN

All the work up to this point will be for nothing if there is no support to adopt the plan. You may see the need for another park, but neighbors may object to having children playing so close to their homes; or an acquisition project may threaten to break up a neighborhood and generate loud and angry protests. Getting public acceptance is vital to reducing conflicts and building support for recommendations.

Make the draft plan available for review by affected residents and businesses, appropriate community departments, interested organizations, state and federal agencies, and neighboring communities. In larger cities and counties, the plan should be circulated for approval by all affected department heads.

After people have had several weeks to evaluate the plan, hold a public meeting or workshop. Such a meeting is a requirement for many funding programs (and CRS credit).

Adoption: After the public meeting, make the appropriate changes to the plan. Then submit it for adoption by your community's governing board—also a CRS requirement.



Monitoring: No plan is perfect. As implementation proceeds, flaws will be discovered and changes will be needed. You should have a formal process to measure progress, assess how things are proceeding, and decide on needed changes.

Those responsible for implementing the various recommendations probably have many other jobs to do. A monitoring system helps ensure that they don't forget their assignments or fall behind in working on them. The system can be in the form of a checklist maintained by the person designated as responsible for the plan (probably you), or a more formal reporting system to a higher authority, such as the governing board or an oversight committee.

Evaluation: Even if you are successful in getting the recommendations implemented, your plan should be evaluated in light of progress and changed conditions. Your planning committee should meet periodically to review progress and submit recommendations to the agencies and organizations responsible for implementation. The action plan should have clearly defined tasks and deadlines.

Planning Hint

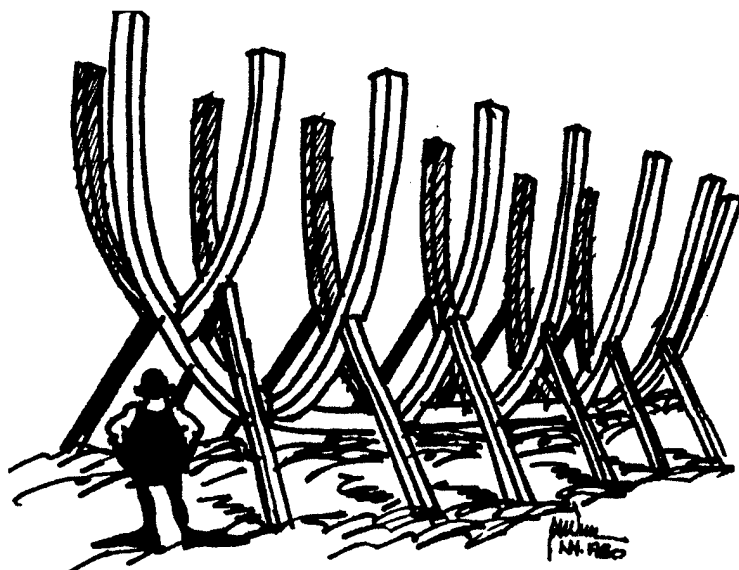
Be Prepared: A good example of flexible implementation is the process used in Plainfield, Illinois. In 1990, a tornado destroyed 20 buildings in the village's floodway. Federal disaster assistance and state flood protection funds were made available to buy the properties and convert the damaged areas into open space.

While the plan will usually produce the best and most efficient program, be ready to take advantage of opportunities, such as those that result from:

- A disaster that opens the floodplain to redevelopment (see hint above)
- Extra end-of-the-year money from a funding agency
- Changes in one of the non-flood concerns
- Heightened public interest due to a disaster elsewhere

Such events may present the opportunity to implement a stalled recommendation, revise the plan, or effect other major changes. Be prepared and flexible. Above all, plan before the flood. Remember:

*It wasn't raining
when Noah built the ark.*



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Where to Get More Help

Many states have prepared their own mitigation planning guidance. Contact your state's emergency management or flood insurance coordinating office for this information. The following publications can be of assistance. They can be ordered from their publisher by calling the number noted.

American Planning Association and Federal Emergency Management Agency (FEMA). *Planning for Post-Disaster Recovery and Reconstruction*. PAS Report No. 483/484. 1998. This report describes steps in the process of community planning for postdisaster recovery and reconstruction for all hazards. It contains planning and administrative tools that can be used to facilitate recovery that integrates mitigation and other planning goals, and includes a model ordinance. Available from FEMA at (800) 480-2520.

Association of State Floodplain Managers (ASFPM). *Addressing Your Community's Flood Problems: A Guide for Elected Officials*. 1996. This booklet provides a good explanation of why planning is needed, along with recommendations and first person testimonials. It is excellent background reading for elected officials. For information on how to obtain a copy, call ASFPM: (608) 274-0123.

ASFPM and U.S. Environmental Protection Agency. *Using Multi-Objective Management to Reduce Flood Losses in Your Watershed*. 1996. This publication reviews the 10-step planning process and coordination of a hazard mitigation plan with other community goals and objectives. It includes examples, references, and lists of sources of assistance. To order, call ASFPM: (608) 274-0123.

Burby, Raymond J., ed. *Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities*. 1998. This volume reviews the findings of the National Assessment on Natural Hazards and discusses how land-use planning can support hazard mitigation and the building of disaster-resistant communities. To order, call the National Academy Press: 800/624-6242, or access their Web site: <http://www.nap.edu>.

FEMA. *Benefit/Cost Analysis of Hazard Mitigation Projects*. 1995. This document includes computer software and instructions. It provides a handy tool to determine the economic benefits of alternative projects and is primarily useful when looking at how to best protect a building. Call FEMA at (800) 480-2520 for a free copy.

FEMA. *Example Plans, Community Rating System*. This document also reviews the 10-step planning process along with the details on how to receive the most CRS credit for your plan. Three fictitious example community plans are included: one for a small town facing riverine flooding, one for a coastal barrier island, and an abbreviated plan for a repetitive loss area in a western county. To order, call the *Community Rating System Technical Coordinator*, (317) 848-2898.

FEMA. *Multi-Hazard Identification and Risk Assessment*. 1997. This document is a good introduction to what's needed to identify and assess the full range of natural hazards affecting a given area. It is appropriate if your plan will include non-flood hazards (which all plans should). Call FEMA, (800) 480-2520, to obtain a copy.

FEMA. *National Flood Insurance Program: Community Rating System (NFIP/CRS)—Coordinator's Manual*. 1996. The CRS manual gives communities participating in the National Flood Insurance Program a chance to show that their efforts to reduce flood losses or improve the sale of flood insurance exceed minimum requirements. The manual contains application forms, detailed information about CRS requirements, a sample repetitive loss program, and a community floodplain management plan. To order, call the *Community Rating System Technical Coordinator*, (317) 848-2898.

FEMA and National Park Service. *A Multi-Objective Planning Process for Mitigating Natural Hazards*. 1995. This guide is an easy-to-read description of an alternative approach to public involvement in mitigation planning. It includes many examples and materials for conducting an intensive workshop. To request a copy, call FEMA, (800) 480-2520.

Mileti, Dennis S. *Disasters by Design: A Reassessment of Natural Hazards in the United States*. 1999. This report is an account of the latest conclusions of the National Assessment of Research and Applications on Natural Hazards. It calls for and illustrates the rationale for redirecting mitigation toward building disaster-resistant or sustainable communities. To order a copy, call the National Academy Press, (800) 624-6242. Copies can also be ordered on-line for a 20% discount at <http://www.nap.edu>. That same URL directs readers to the National Academy of Science on-line Readingroom, where the full text of the report can be viewed.

Several web sites can help, too:

<http://www.fema.gov>

This URL opens a host of FEMA resources. Check out the Mitigation Library. Many of the latest FEMA publications can be downloaded from that source.

<http://www.fema.gov/nfip/crs.htm>

This site covers the National Flood Insurance Program's Community Rating System.

<http://www.floods.org>

The home page for the Association of State Floodplain Managers has the latest calendar of activities and conferences of interest to flood mitigation planners.

<http://www.colorado.edu/hazards>

This is the Web site of the University of Colorado's Natural Hazards Research and Applications Information Center, a national clearinghouse of research and public policy on floods and other natural hazards. The site provides access to the center's electronic bibliographic database, HazLit; recent issues of its periodicals, the *Natural Hazards Observer* and *Disaster Research*; other center publications; and information on upcoming conferences, recently awarded research grants, and links to other hazard-related Web sites.

The Natural Hazards Informer

The *Natural Hazards Informer* is published irregularly by the Natural Hazards Research and Applications Information Center at the University of Colorado-Boulder. The *Informer* provides a concise, peer-reviewed synthesis of state-of-the-art research on specific hazard issues. Its purpose is to provide natural hazards practitioners and emergency management specialists knowledge they can use to better prepare for, respond to, recover from, and mitigate the effects of natural disasters.

We welcome ideas for other issues of the *Informer*. If you have an idea and are interested in writing a brief, easy-to-read, and readily applicable state-of-the-art review on that topic for a future issue, contact the Natural Hazards Center's co-director at the address below.

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